

Embryo 2:

- **The lower urinary system composed of the:**
 - Bladder and the urethra.
- Is formed from the **endoderm** of the hindgut.
- During **the fourth to seventh** weeks of development, the **Cloaca divides** into the urogenital sinus **anteriorly and the** anal canal **posteriorly**.
- **Three portions of the urogenital sinus can be distinguished:**
 1. the upper largest part (vesical) gives the urinary bladder.
 2. The **pelvic part in male** gives rise to **the prostatic and membranous parts of the urethra**, in female it gives the whole urethra and part of the vagina.
 3. The **phallic part** give the **spongy urethra (urethral plate) in male**, in female it gives the vestibule and the labia minora.
- Its trigone region is derived from the caudal ends of the mesonephric ducts.
- The entire epithelium of the bladder is derived from the endoderm of the vesical part.
- The other layers (connective tissue and smooth muscle) of its wall develop from adjacent splanchnic mesenchyme.
- The urachus connects the apex of the bladder with the umbilicus.
- In the adult, it is known as the median umbilical ligament.
- The distal parts of the mesonephric ducts in the male become the ejaculatory ducts.

- **Development of the urethra :**
 - The urethra forms itself from the lower part of the urogenital sinus (UGS).
 - The epithelium of the prostatic urethra forms the prostate gland in male.
 - In the female, the cranial part of the urethra gives rise to the urethral and para-urethral glands.
- **Bladder Defects:**
 1. Urachal fistula=**Persistence of intraembryonic portion of the allantois** (urine drains through umbilicus).
 2. Urachal cyst= Persistence of **local area** of allantois.
 3. Urachal sinus= Persistence of the **upper part** of allantois.
 4. Exstrophy of the bladder is **a ventral body wall defect in which the bladder mucosa is exposed.**
 - **Pispadias is a constant feature.**
 - **Exstrophy of the bladder** is due to: lack of mesodermal migration between the umbilicus and genital tubercle.
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 5. **Exstrophy of the cloaca** is a severe ventral body wall defect due to: migration of mesoderm to the midline is inhibited.
 - **The defect includes :**
 - 1- Exstrophy of the bladder,
 - 2- Spinal defects,
 - 3-imperforate anus,
 - 4- omphalocele.